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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number: 0 410 059 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: 22.06.94 (51) Int. Cl. 5: B65D 41/34

(21) Application number: 89310765.6

(22) Date of filing: 19.10.89

(54) Tamper indicating package, method of and apparatus for making the closure thereof.

(30) Priority: 27.07.89 US 386391

(43) Date of publication of application:
30.01.91 Bulletin 91/05

(45) Publication of the grant of the patent:
22.06.94 Bulletin 94/25

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

(56) References cited:
EP-A- 0 307 169
US-A- 4 653 657
US-A- 4 801 030

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EP 0 410 059 B1

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Description

This invention relates to tamper indicating packages.

Background and Summary of the Invention

In packaging of containers having closures thereon, it has been common to provide tamper indicating packages wherein the tamper indicating band is connected to the closure along the weakened line provided by a plurality of bridges or a scoreline and interengaging means between the band and the container are such that when the closure is unthreaded from the container, the band is severed along the bridge portions to indicate that the closure has been tampered with.

In U.S. Patent No. 4,394,918 issued to Jean Grussen on July 26, 1983, a threaded closure carries a hold ring that is joined to the bottom of the cap skirt by a series of breakable tabs and the hold ring has an inside diameter that is at least equal to the outside diameter of the cap skirt. A plurality of lock lugs supported on the ring are inclined upwardly and inwardly and are intended to hook behind a collar or mating ring on the container neck to prevent the hold ring from being lifted off the container neck when the cap is unscrewed.

In U.S. Patent No. 4,550,844, having a common assignee with the present application, there is disclosed and claimed an arrangement wherein a continuous annular flange extends from the lower end of the tamper indicating band and is inclined upwardly and inwardly. Such an arrangement is effective but has the disadvantage that the continuous flange requires excessive force to apply the closure to the container in certain extreme tolerance conditions.

In an effort to reduce the force required to apply the closure, it has heretofore been suggested in U.S. Patent No. 4,653,657 that the free edge of the continuous annular flange be provided with a plurality of segments to facilitate application of the closure.

U.S. Patent No. 4,807,771 proposes the use of a plurality of spaced-apart ring segments on the tamper indicating band to define independently foldable ring segments and a plurality of resilient tabs connected to each end of each ring segment so that the free ends of the tabs bear on the bead or ledge of the container.

U.S. Patent No. 4,801,030, which corresponds to the nearest prior art, describes a closure of the same general type in which the annular flange is provided with a plurality of circumferentially-spaced flexible walls attached to its radially inner surface.

Among the objects of the present invention are to provide a tamper indicating package with an improved arrangement for interengaging the closure with the container so that when the closure is removed the tamper indicating band remains on the container; wherein the closure can be readily applied to the container; and wherein the tamper indicating package effectively minimizes tampering. The present invention also seeks to provide a method and apparatus for producing the closure of such a package.

In accordance with the invention, a tamper indicating package has the features set forth in claim 1, and a method of and an apparatus for making the closure thereof are mainly defined respectively in the claims 15 and 19.

Description of the Drawings

20 Fig. 1 is a fragmentary elevational view of a package embodying the invention.

Fig. 2 is a vertical sectional view of the package shown in Fig. 1.

25 Fig. 3 is a fragmentary sectional view of the package on an enlarged scale.

Fig. 4 is a fragmentary sectional view on an enlarged scale of a portion of the closure.

Fig. 5 is a fragmentary sectional view showing the application of the closure to the container.

30 Fig. 6 is a sectional view of the closure as it is molded.

Fig. 7 is a fragmentary elevational view of a portion of the closure shown in Fig. 6.

35 Fig. 8A is a fragmentary sectional view on an enlarged scale of a portion of the closure shown in Fig. 9.

Fig. 8B is a fragmentary sectional view on an enlarged scale of a portion of the closure shown in Fig. 8A, after it has been formed to its final configuration.

40 Figs. 9-14 are partly diagrammatical sectional views showing the inversion of the flange from the as-molded position to the final position in closure.

45 Fig. 15 is a schematic diagram of the inversion of the flange on the tamper indicating band of the closure.

Figs. 16-18 are sectional views of portions of a modified closure.

50 Figs. 19-21 are sectional views of portions of another modified closure.

Fig. 22 is a sectional view similar to Fig. 3 showing the relative position of the container and closure during removal of the closure.

55 Fig. 23 is a sectional view of the container and closure shown in Fig. 23 during removal of the closure.

Fig. 25A is a fragmentary sectional view of the closure shown in Figs. 23 and 24 as it is molded.

Fig. 25B is a fragmentary sectional view of the closure shown in Fig. 25A after it is has been formed to its final configuration.

Fig. 26 is a sectional view of another modified form of closure as it is molded.

Fig 27 is a fragmentary sectional view showing the closure shown in Fig. 26 after it is formed and applied to a container.

Fig. 28 is a fragmentary sectional view showing the closure of Fig. 26 as it is being removed.

Description

Referring to Fig. 1, the tamper indicating package embodying the invention comprises a container 30 having a finish or neck 31 and a closure 32. The closure 32 is formed of thermoplastic material such as polypropylene or polyethylene which is molded as a single unit and comprises a generally disc shaped top or base wall 33 with a cylindrical depending skirt portion 34 (Fig. 2). A tamper indicating band 35 which is generally cylindrical is connected to the peripheral skirt 34 by a weakened line defined by bridges or scored portions of the skirt 34, herein shown as an interrupted scoreline 36. Interengaging threads 32a, 31a are provided on the closure and neck and cooperate to apply and hold the closure in position on the container. The container 30 includes an annular bead 37.

Referring to Figs. 2, 3, and 8B, an annular flange 40 is connected to the inner surface of the tamper indicating band by an integral hinge portion 41 that is spaced so that it extends radially inwardly of the inner surface of the tamper indicating band 35 and the flange 40 extends upwardly and inwardly toward the base wall of the closure. The flange 40 includes a first continuous annular flange portion 42 that extends from hinge portion 41 at a slight angle radially inwardly before the closure is applied to the container. The flange 40 further includes a second portion comprising a plurality of integral circumferentially spaced segment portions 43 which extend from within the first continuous flange portion 42. The flange 40 is bent at X intermediate its ends so that the free ends of the segment portions 43 comprising the second portion extend at a different and greater angle with the axis of the closure than the first continuous flange portion 42 of the annular flange 40. The annular flange portion 42 thus has a first pivot or hinge relative to the band 35 through hinge portion 41 and the segment portions 43 have a second hinge with respect to the remainder of flange 40 at X. The first continuous flange portion 42 extends axially at a very small acute angle with respect to the band 35 so that it is substantially vertical before the closure is applied to the container.

The width of each segment portion 43 is at least several times greater than the thickness at its smaller cross section. The segment portions are generally rectangular and closely spaced apart by narrow slots S such that the segment portions comprise the major portion of the second portion. The number of segment portions 43 is preferably twelve but may be as few as two. In this embodiment the slots S extend from the free edge of the segments beyond the bend line X so that the length of the segment portions 43 is greater than the corresponding length of flange portion 42. Satisfactory results have been achieved where segment portions 43 of the flange 40 comprise about 60% of the flange 40 while the flange portion 42 comprises about 40%. However, the length of the slots may vary. It is essential that the continuous flange portion 42 have a sufficient dimension or length so that the flange 40 will remain inverted, without heat forming and curing, as hereinafter described.

As shown in Fig. 5, when the closure 32 is applied to the container 30, the continuous flange portion 42 first engages the annular bead 37 on the container 30 and flexes the flange 40 outwardly. During application, the first continuous portion flexes radially outwardly and the free ends of segment portions 43 may contact the inner surface of band 35. Further threading of the closure on the container causes segment portions 43 to flex radially inwardly beneath the bead 37 of the container 30 (Fig. 3). When the closure is applied, the first continuous flange portion 42 is substantially vertical and the free edges of segment portions 43 engage the neck of the container below bead 37.

It has been found that the closure which forms part of the tamper indicating package requires a substantially lower application force in applying the closure and yet effectively provides the desired tamper indicating protection. It is believed that the considerable reduction in application force to pass over the bead on the container is achieved by reducing the hoop strength of the flange 40 toward its extremity. It is preferred that the bend in the flange 40 be at or near the juncture of the segment portions 43 with the flange portion 42. In such an arrangement, the segment portions 43 are at a thickness at the bend line X such that they are able to bend approximately along hinge line X. A radially outward force on the tips of the segment portions 43 will first cause bending at the hinge line X and thus allow easier deflection of the segment portions 43 of the flange 40, thereby reducing application force. Where the length of the slots S is such that the base of the slots is intermediate the bend line X and the free ends of the segment portions 43, the segment portions 43 may flex adjacent the base of the slots that define the seg-

ment portions.

As shown in Fig. 22, when the closure is rotated to remove the closure from the container, the free edges of segment portions 43 engage the bead 37. Continued rotation of the closure 32 causes the flange 40 to bend along the line X and bring the segment portions 43 into engagement with the inner inclined surface of band 35. Further rotation causes the band to be severed along the scoreline.

Although the closure could, by complex molding apparatus, be made to the final configuration as shown in Fig. 4, it is preferred that the closure be made with the flange 40 extending radially inwardly and axially outwardly away from the base wall of the closure. Accordingly, as shown in Figs. 6 and 7, the closure 32 is preferably molded by injection molding or compression molding with the annular flange portion 42 and segments 43 extending radially downwardly and inwardly relative to the base wall 33 of the closure 32 with the annular flange and segments being preferably aligned with one another. More specifically, as shown in Figs. 7 and 8A, the first hinge portion 41 connecting the annular flange portion 42 to the band 35 includes an upper inclined surface 45 that extends downwardly and inwardly from the inner surface of band 35 and that merges through an arc to a straight upper surface on the annular flange portion 42 and segment portions. The lower surface 47 of the annular flange 40 is at an angle to the upper surface so that the flange 40 becomes increasingly thicker toward the free end. The lower surface 48 of the hinge 41 is generally horizontal connected by a small arc to the interior surface of the peripheral skirt.

After forming to the configuration shown in Fig. 8A, the flange 40 can be deformed to provide the flange portion 42 at a substantially vertical angle and deformed to form the bend X and then the flange 40 may be inverted in accordance with wellknown techniques. However, it has been found by proper control of the inversion process, the continuous flange portion 42 can be deformed so that it is substantially vertical and the bend X can be simultaneously formed during the inversion. More specifically, by proper control of the inversion, the elastic limit of the flange portion 42 can be exceeded to decrease the angle which the flange portion 42 forms with the axis of the closure and the elastic limit of the flange at the line X can be exceeded to form the bend desired.

It has been found that the inversion of the annular flange portion 42 and segment portions 43 to form the separate angular relationship between the annular flange portion and the segment portion 43 is preferably achieved by a plunger or mandrel M such as shown in Figs. 9-14 and comprises a

free end having a cap centering cone 50, a thread location diameter 51 for engaging the diameter of the threads of the closure, a first inclined portion, a pilot diameter 52 and a laterally inclined inverting shoulder 53 that engages the segment portions to invert the segment portions and the annular flange portion, as presently described.

The successive steps during the inversion are shown in Figs. 9-14 and include the following:

- 5 a) The closure is advanced into the tooling nest radially with respect to a machine, and is approximately located on center by an inverting mandrel M. The mandrel M may at this time be rotating in order to effect a subsequent scoring operation.
- 10 b) Relative axial movement takes place between the closure 32 and the mandrel M by cam actuation of the respective tooling (top and bottom).
- 15 c) The relative advance of the mandrel M to the closure 32 initially engages the segment portions 43 of the closure against the cap centering cone 50 (Fig. 9). This action centers the closure 32 under the mandrel M by displacing the closure sideways as necessary to correct misalignment.
- 20 d) As the above relative movement continues, the segment portions 43 engage the thread location diameter 51, and the friction therebetween may impart a rotational motion to the closure, if desired, such that when the segment portions 43 reach the pilot diameter 52, the closure is either at or close to the rotational speed of the mandrel (Fig. 10).
- 25 e) As the segment portions 43 engage the pilot diameter 52, they engage with more interference, and this is critical for this inversion method. The hoop strengths of the flange portion 42 and segment portions 43 direct the free ends of the segment portions 43 toward the mandrel M, and thus ensure that they do not slip over the inverting shoulder 53 (Fig. 11). Further, this interference provides further rotational drive to the cap, if desired, and for this reason it is preferred that the relative axial movement is in dwell at this time to ensure that there is little or no relative rotational movement between the closure and the inversion shoulder at the time of inversion. This reduces the possibility of scuffing of the tips of the segment portions.
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It is desirable at this time that the thread location diameter 51 of the mandrel engage the closure threads to hold the closure 32 in firm concentric relationship to the mandrel M.

Further relative axial movement of the mandrel M with respect to the lower tooling (and closure) causes the flange 40 to be folded downwardly, and initially to be contained within the annular space

between the pilot diameter of the mandrel and the band 35 (Fig. 11). This causes a bending within the section of the flange 40, the center of this bending moving in the direction downward toward the top 33 of the (upside down) closure (Fig. 12).

This action continues, whereby the bending action passes along the flange toward its tip, and toward successively increasing thickness of segment portions 43 (Fig. 13). At some point in this process, the band is expanded such that the segment portions 43 are inverted by the axial movement of the mandrel (Fig. 13).

This action initially induces a stress in the segment at the bend line X, which causes a permanent bend in the flange 40 toward the inside of the closure.

As the mandrel M advances further, the shoulder 53 passes through the diameter of the first hinge 41 (Fig. 14).

This action causes the continuous annular flange 40 to be moved such that the flange portion 42 exceeds the elastic limit at the hinge 41 so that it remains in a substantially vertical position in the final closure after the closure is removed from the mandrel. This further reduces the interference of the hinge over the tamper bead of the container to which it is applied.

During withdrawal of the mandrel, the closure 32 is removed by a fixed stripper (not shown) which engages the rim of the closure 32, and extends at least 180° around the circumference of the closure (not illustrated).

The plunge invert tooling described thus has two major effects:

- Deforming the flange portion 42 back toward the closure wall 35.
- Forming the bend X to create a permanent bend, to allow the segment portions 43 to project radially inwardly to a greater angle than the first continuous flange portion 42.

It has been found that after inversion in the manner described above, the flange 40 is in stable condition and this has been achieved without the necessity of heating.

In the form of closure shown in Figs. 16-18, the flange 40a has segment portions 43a with raised portions 60 along each axial edge thereof positioned adjacent the inner surface of the flange 40a when the flange 40a is inverted. Such a thickening of the side edges provides rigidity to each segment portion 43a in an axial direction while permitting circumferential flexing of each segment portion 43a so that it may tend to conform with the finish.

In the form shown in Figs. 19-21, a raised rib 61 on the flange 40b performs a similar function.

In the form of closure shown in Figs. 23, 24, 25A and 25B, the second portion 43a comprises a second continuous flange portion which is con-

nected to continuous flange portion 42 and extends at a greater angle therefrom. In all other respects, the closure is similar, is made in the same manner, and functions in the same manner.

5 In the modified form of closure shown in Figs. 26-28, the closure is identical to that shown in Figs. 2-8A and 8B except for the provision of circumferentially spaced axially extending projections 70 on the inner surface of the band 35 above the inclined surface 45. The projections are aligned with the slots S and have a width slightly less than the width of the slots. The length of the projections as shown in Figs. 27 and 28 is such that lower edges of the projections are not engaged by the 10 second portion of the flange 40, namely, the segment portions 43.

15 When the closure is applied to the container, the projections function to deter any attempts to tamper with the tamper indicating band by hooking a tool on the segment portions 43.

20 It can thus be seen that there has been provided a tamper indicating package with an improved arrangement for interengaging the closure with the container so that when the closure is removed the tamper indicating band remains on the container; wherein the closure can be readily applied to the container; and wherein the tamper indicating package effectively minimizes tampering.

25 Claims

1. A tamper indicating package comprising a container (30) having a neck (31) with a threaded finish, 35 an annular bead (37) on the neck, a plastic closure (32) which includes a base wall (33) and a depending peripheral skirt (34) having threads interengaging the threads of the container, 40 a tamper indicating band (35) attached to the skirt by one or more weakened portions defining a line of severing (36), 45 an annular flange (40) extending axially upwardly and inwardly from the tamper indicating band toward the base wall of the closure, 50 the flange comprising a first continuous annular flange portion (42) connected to an inner surface of the tamper indicating band (35) by a hinge (41) spaced radially inwardly from the inner surface of the band, characterised in that the flange is bent intermediate its ends to form a second portion (43, 43a) such that the second portion extends inwardly at a greater angle to the axis of the closure than the first continuous flange portion, the free end of the second portion engaging beneath the bead on the container when the closure is threaded

onto the container,
 the tamper indicating band having an inner surface (45) adapted to be engaged by the first continuous flange portion (42) when the closure is being removed to cause the flange to bend along the bend (X) therein said flange being such that when the closure is applied to the container the second portion (43, 43a) initially engages the bead (37) on the container and flexes at the bend to tend to straighten the bend and thereafter the first portion (42) flexes relative to the band (35) and the free end of the second portion engages beneath the bead.

2. A tamper indicating package as claimed in claim 1 wherein the second portion comprises a plurality of circumferentially spaced segment portions (43) separated by slots (S).

3. A tamper indicating package as claimed in claim 2 wherein the configuration of the segment portions is substantially rectangular.

4. A tamper indicating package as claimed in claim 2 or 3 wherein the bend in the flange is at or near the bases of the segment portions.

5. A tamper indicating package as claimed in any of claims 2 to 4 wherein the segment portions include means thereon for increasing the rigidity thereof.

6. A tamper indicating package as claimed in claim 5 wherein the means for increasing the rigidity of the segment portions comprises deformed portions on the segment portions.

7. A tamper indicating package as claimed in claim 6 wherein said means comprises an axially extending rib (61).

8. A tamper indicating package as claimed in any of claims 2 to 7 including a plurality of circumferentially spaced axially extending projections (70) on the inner surface of the band and axially aligned with the slots (S) such that the projections block the insertion of means for hooking on the segment portions.

9. A tamper indicating package as claimed in claim 1 wherein the second portion comprises a second continuous annular flange portion.

10. A tamper indicating package as claimed in any of claims 1 to 9 wherein the first continuous annular flange portion is substantially parallel to the axis of the closure.

5 11. A tamper indicating package as claimed in any of claims 1 to 10 wherein the hinge includes a downwardly and inwardly tapered upper surface (45) along the tamper indicating band and a generally transverse surface (48) extending from the band to a thin cross section spaced from the inner surface of the tamper indicating band.

10 12. A tamper indicating package as claimed in any of claims 1 to 11 wherein the thickness of the flange increases progressively from the hinge to its free end.

15 13. A tamper indicating package as claimed in any of claims 1 to 12 wherein the inner surface of the tamper indicating band comprises an inclined surface extending axially away from said base wall of the closure and radially inwardly.

20 14. The closure of the tamper indicating package of any of claims 1 to 13.

25 15. A method of making a closure having an annular bend in a flange extending axially inwardly with respect to a base wall, which method comprises:
 forming a plastic closure having a base wall and a peripheral skirt,
 the skirt having a tamper indicating band and an integral flange extending radially inwardly and axially outwardly with respect to the base wall,
 the flange comprising a continuous annular flange portion and a second portion, the annular flange portion being connected to the tamper indicating band by a hinge portion;
 thereafter advancing a plunger into the closure to engage the flange and to invert the flange so that it extends radially inwardly and upwardly relative to the base wall of the closure, said flange at the same time being bent such that said second portion extends from the continuous annular flange portion at an angle to the axis of the closure greater than that of the continuous annular flange portion.

30 16. A method as claimed in claim 15 wherein the step of forming the second portion comprises forming a plurality of circumferentially spaced segment portions extending downwardly and outwardly from the continuous flange portion.

35 17. A method as claimed in claim 15 wherein the step of forming the second portion comprises forming a second continuous annular flange portion.

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18. A method as claimed in any of claims 15 to 17 wherein the step of forming the bend in the flange comprises confining the free edge of the second portion against radially inward movement and applying an axial force to the free edge which free edge is confined against radially inward movement to invert the flange and form a bend therein.

19. Apparatus for making a closure having an annular bend in a flange extending axially inwardly with respect to a base wall, which apparatus comprises:

means for forming a plastic closure having a base wall and a peripheral skirt, the skirt having a tamper indicating band and an integral flange extending radially downwardly and inwardly with respect to the base wall,

the flange comprising a continuous annular flange portion and a second portion having a free edge, the annular flange portion being connected to the tamper indicating band by a hinge portion; and

means for advancing a plunger (M) axially relative to the closure;

wherein the plunger is shaped to confine the free edge of the second portion against radially inward movement and to apply an axial force to the said free edge to invert the flange and form a bend therein.

20. Apparatus as claimed in claim 19 wherein the means for forming the second portion comprises means for forming a plurality of circumferentially spaced segment portions extending downwardly and outwardly from the continuous flange portion.

21. Apparatus as claimed in claim 19 wherein the means for forming the second portion comprises means for forming a second continuous annular flange portion.

22. Apparatus as claimed in any of claims 19 to 21 wherein the plunger (M) comprises a free end having a cap centering cone (50), a portion (51) for engaging the threads of the closure, a first inclined portion, a pilot diameter portion (52) and an inverting shoulder (53) such that upon relative movement between the plunger and closure the plunger initially engages the flange (40) against the closure centering cone (50), and as the plunger is further advanced the flange reaches the pilot diameter portion (52), further relative movement of the plunger and closure causes the inverting shoulder (53) to bend and invert the flange and form a hinge and further relative movement between the

5 plunger and closure causes the shoulder (53) to pass through the diameter of the hinge exceeding the elastic limit of the hinge such that it remains in position.

10 23. Apparatus as claimed in any of claims 19 to 22 including means for rotating the plunger (M) during its movement relative to the closure.

15 10 **Patentansprüche**

1. Originalitätsgesicherte Verpackung mit folgenden Merkmalen:

15 ein Behälter (30) weist einen Hals (31) mit einer Schraubendfläche auf;

20 ein am Hals angebrachter Ringwulst (37);

25 ein Kunststoffverschluß (32), der eine Basiswand (33) und eine nach unten reichende peripherie Ringwand (34) mit Verschraubungen zum Eingriff in die Verschraubungen des Behälters aufweist;

30 ein Unversehrtheitsanzeigeband (35) ist an der Ringwand über eine oder mehrere geschwächte Teile befestigt, die eine Abtrennlinie (36) definieren;

35 ein Ringflansch (40) erstreckt sich axial nach oben und unten von dem Unversehrtheitsanzeigeband zu der Basiswand des Verschlusses;

40 der Flansch weist einen ersten kontinuierlichen Ringflanschteil (42) auf, der mit der Innenfläche der Unversehrtheitsanzeigebandes (35) über ein Scharnier (41) verbunden ist, das radial nach innen von der Innenseite des Bandes einen Abstand einhält, dadurch gekennzeichnet, daß der Flansch zwischen seinen Enden zur Bildung eines zweiten Teils (43, 43a) so gebogen ist, daß sich der zweite Teil nach innen mit einem größeren Winkel zur Achse des Verschlusses erstreckt als der erste kontinuierlich Flanschteil, wobei das freie Ende des zweiten Teils unterhalb des Wulstes am Behälter eingreift, wenn der Verschluß auf den Behälter geschraubt wird,

45 daß das Unversehrtheitsanzeigeband eine Innenfläche (45) aufweist, die zur Anlage an dem ersten kontinuierlichen Flanschteil (42) ausgebildet ist, wenn der Verschluß entfernt wird, um den Flansch zur Biegung entlang der darin angebrachten Biegung (X) zu bringen, wobei der Flansch so ausgebildet ist, daß wenn der Verschluß an den Behälter angelegt wird, der zweite Teil (43, 43a) zunächst an dem Wulst (37) an dem Behälter anliegt und an der Biegung mit einer Tendenz zum Geraderichten der Biegung abbiegt, daß danach der erste Teil (42) relativ zu dem Band (35) abbiegt und das freie Ende des zweiten Teils unterhalb des Wulstes eingreift.

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2. Originalitätsgesicherte Verpackung nach Anspruch 1, dadurch gekennzeichnet, daß der zweite Teil eine Mehrzahl von in Umfangsrichtung voneinander entfernt angeordneten Segmentteilen (43) aufweist, die durch Slitzte (S) voneinander getrennt sind. 5 innen sich verjüngende obere Fläche (45) entlang des Unversehrtheitsanzeigebandes und eine generell quergerichtete Fläche (48) aufweist, die sich von dem Band zu einem dünnen Querschnitt erstreckt, der von der Innenfläche des Unversehrtheitsanzeigebandes einen Abstand aufweist.

3. Originalitätsgesicherte Verpackung nach Anspruch 2, dadurch gekennzeichnet, daß die Gestalt der Segmentteile im wesentlichen rechteckförmig ist. 10

4. Originalitätsgesicherte Verpackung nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die Biegung des Flansches bei oder nahe den Basen der Segmentteile angeordnet ist. 15

5. Originalitätsgesicherte Verpackung nach einem der Ansprüche 2 bis 4, dadurch gekennzeichnet, daß die Segmentteile daran angebrachte Einrichtungen zur Vergrößerung der Steifigkeit aufweisen. 20

6. Originalitätsgesicherte Verpackung nach Anspruch 5, dadurch gekennzeichnet, daß die Einrichtungen zur Vergrößerung der Steifigkeit der Segmentteile deformierte Teile an den Segmentteilen umfassen. 25

7. Originalitätsgesicherte Verpackung nach Anspruch 6, dadurch gekennzeichnet, daß die Einrichtung eine axial sich erstreckende Rippe (61) aufweist. 30

8. Originalitätsgesicherte Verpackung nach einem der Ansprüche 2 bis 7, dadurch gekennzeichnet, daß eine Mehrzahl von in Umfangsrichtung im Abstand angeordnete axial sich erstreckender Vorsprünge (70) auf der Innenfläche des Bandes vorgesehen ist, die in axialer Richtung zu den Slitzten (S) ausgerichtet sind, so daß die Vorsprünge die Einfügung der Einrichtung zum Einhaken an den Segmentteilen blockiert. 35

9. Originalitätsgesicherte Verpackung nach Anspruch 1, dadurch gekennzeichnet, daß der zweite Teil einen zweiten kontinuierlichen ringförmigen Flanschteil umfaßt. 40

10. Originalitätsgesicherte Verpackung nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß der erste kontinuierliche ringförmige Flanschteil im wesentlichen parallel zur Achse des Verschlusses ausgerichtet ist. 45

11. Originalitätsgesicherte Verpackung nach einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, daß das Scharnier eine nach unten und 50 55 innen sich verjüngende obere Fläche (45) entlang des Unversehrtheitsanzeigebandes und eine generell quergerichtete Fläche (48) aufweist, die sich von dem Band zu einem dünnen Querschnitt erstreckt, der von der Innenfläche des Unversehrtheitsanzeigebandes einen Abstand aufweist.

12. Originalitätsgesicherte Verpackung nach einem der Ansprüche 1 bis 11, dadurch gekennzeichnet, daß die Dicke des Flansches progressiv von dem Scharnier zu dem freien Ende zunimmt. 60

13. Originalitätsgesicherte Verpackung nach einem der Ansprüche 1 bis 12, dadurch gekennzeichnet, daß die Innenoberfläche des Unversehrtheitsanzeigebandes eine geneigte Oberfläche aufweist, die sich axial weg von der Basiswand des Verschlusses und radial nach innen erstreckt. 65

14. Der Verschluß der originalitätsgesicherten Verpackung nach einem der Ansprüche 1 bis 13. 70

15. Verfahren zur Herstellung eines Verschlusses mit einer ringförmigen Biegung in einem Flansch, der sich axial nach innen mit Bezug auf eine Basiswand erstreckt, mit folgenden Schritten:
es wird ein Kunststoffverschluß mit einer Basiswand und einer peripheren Ringwand gebildet;
die Ringwand weist ein Unversehrtheitsanzeigeband und einen integralen Flansch auf, der sich radial nach innen und axial nach außen mit Bezug auf die Basiswand erstreckt;
der Flansch weist einen kontinuierlichen ringförmigen Flanschteil und einen zweiten Teil auf, wobei der ringförmige Flanschteil mit dem Unversehrtheitsanzeigeband über ein Scharnierteil verbunden ist;
ein Kolben wird danach in den Verschluß vorgetrieben, um den Flansch zu ergreifen und diesen umzukehren, so daß er sich radial nach innen und oben relativ zur Basiswand des Verschlusses erstreckt, wobei der Flansch zur gleichen Zeit so gebogen wird, daß sich der zweite Teil von dem kontinuierlichen Ringflanschteil in einem Winkel zur Achse des Verschlusses erstreckt, der größer als der des kontinuierlichen ringförmigen Flanschteils ist. 75

16. Verfahren nach Anspruch 15, dadurch gekennzeichnet, daß der Schritt der Bildung des zweiten Teils die Bildung einer Mehrzahl von in Umfangsrichtung voneinander Abstand einhaltender Segmentteile umfaßt, die sich nach un- 80

ten und außen von dem kontinuierlichen Flanschteil erstrecken.

17. Verfahren nach Anspruch 15, dadurch gekennzeichnet, daß der Schritt der Bildung des zweiten Teils die Bildung eines zweiten kontinuierlichen ringförmigen Flanschteils umfaßt. 5

18. Verfahren nach einem der Ansprüche 15 bis 17, dadurch gekennzeichnet, daß der Schritt der Bildung der Biegung in dem Flansch die Beschränkung des freien Endes des zweiten Teils gegen radiale Einwärtsbewegung umfaßt, ferner die Anlage von axialen Kräften an den freien Rand, der gegen radiale Einwärtsbewegung gehalten wird, um den Flansch umzukehren und eine Biegung dadurch zu bilden. 10

19. Vorrichtung zur Herstellung eines Verschlusses mit einer ringförmigen Biegung in einem Flansch, der sich axial nach innen mit Bezug auf eine Basiswand erstreckt, mit folgenden Merkmalen: 15

eine Einrichtung zur Bildung eines Kunststoffverschlusses mit einer Basiswand und einer peripheren Ringwand, wobei die Ringwand ein Unversehrtheitsanzeigeband und einen integralen Flansch aufweist, der sich radial nach unten und innen mit Bezug auf die Basiswand erstreckt; 20

der Flansch weist einen kontinuierlichen ringförmigen Flanschteil und einen zweiten Teil mit einer freien Kante auf, wobei der ringförmige Flanschteil mit dem Unversehrtheitsanzeigeband über ein Scharnierteil verbunden ist; 25

eine Einrichtung zum Vortrieb eines Kolbens (M) axial relativ zum Verschluß; 30

der Kolben ist so gestaltet, daß er die freie Kante des zweiten Teils gegen radiale Einwärtsbewegung beschränkt und eine axiale Kraft an das freie Ende anlegt, um den Flansch umzukehren und darin eine Biegung zu bilden. 35

20. Vorrichtung nach Anspruch 19, dadurch gekennzeichnet, daß die Einrichtung zur Bildung des zweiten Teiles eine Einrichtung zur Bildung einer Mehrzahl von in Umfangsrichtung beabstandeter Segmentteile umfaßt, die sich nach unten und außen von dem kontinuierlichen Flanschteil erstrecken. 40

21. Vorrichtung nach Anspruch 19, dadurch gekennzeichnet, daß die Einrichtung zur Bildung des zweiten Teiles einer Einrichtung zur Bildung eines zweiten kontinuierlichen ringförmigen Flanschteils umfaßt. 45

22. Vorrichtung nach einem der Ansprüche 19 bis 21, dadurch gekennzeichnet, daß der Kolben (M) ein freies Ende mit einem Kappenzentrierungskonus (50), einem Eingriffsteil (51) zur Anlage an den Verschraubungen des Verschlusses, einen ersten geneigten Teil, einen Pilotdurchmesserteil (52) und eine Umkehrungsschulter (53) aufweist, so daß bei relativer Verschiebung zwischen dem Kolben und dem Verschluß der Kolben zunächst den Flansch (40) gegen den Verschlußzentrierungskonus (50) ergreift, und wenn der Kolben weiter vorgetrieben wird, der Flansch den Pilotdurchmesserteil (52) erreicht, die weitere Relativverschiebung des Kolbens und des Verschlusses die Umkehrungsschulter (53) dazu bringt, den Flansch zu biegen und umzukehren und ein Scharnier zu bilden und die weitere relative Verschiebung zwischen dem Kolben und dem Verschluß die Schulter (53) dazu bringt, durch den Durchmesser des Scharniers zu gelangen, wobei die Elastizitätsgrenze des Scharniers überschritten wird, so daß dieser an Ort und Stelle verbleibt. 50

23. Vorrichtung nach einem der Ansprüche 19 bis 22, dadurch gekennzeichnet, daß eine Einrichtung zum Drehen des Kolbens (M) während seiner Verschiebung relativ zu dem Verschluß vorgesehen ist. 55

Revendications

1. Emballage à preuve de violation, qui comprend:
 - un récipient (30) présentant un goulot (31) avec une terminaison filetée,
 - une moulure annulaire (37) sur le goulot,
 - une fermeture en plastique (32) qui inclut une paroi de base (33) et une jupe périphérique (34) qui en descend, comprenant des filets qui se vissent sur les filets du récipient,
 - une bande (35) indicatrice de violation, fixée à la jupe par une ou plusieurs parties affaiblies qui définissent une ligne de séparation par rupture (36),
 - une collierette annulaire (40) qui s'étend axialement vers le haut et vers l'intérieur depuis la bande indicatrice de violation (35) en direction de la paroi de base de la fermeture,
 - la collierette comprenant une première partie de collierette (42) annulaire et continue, reliée à une surface intérieure de la bande indicatrice de violation (35) par une charnière (41) espacée radialement vers l'intérieur de la surface intérieure.

rieure de la bande, caractérisé en ce que :

- la collerette est coudée entre ses extrémités pour former une seconde partie (43, 43a) de telle sorte que la seconde partie s'étende vers l'intérieur en faisant un angle plus grand avec l'axe de la fermeture que la première partie continue de la collerette, l'extrémité libre de la seconde partie s'engageant sous la moulure du récipient lorsque la fermeture est vissée sur le récipient,
- la bande indicatrice de violation a une surface intérieure (45) apte à être accrochée par la première partie continue (42) de la collerette lorsqu'on retire la fermeture pour amener la collerette à se plier le long du coude (X) qu'elle contient, la collerette étant telle que, lorsqu'on met en place la fermeture sur le récipient, la seconde partie (43, 43a) accroche d'abord la moulure (37) du récipient et se fléchit au niveau du coude pour tendre à redresser le coude et, ensuite, la première partie (42) fléchit par rapport à la bande (35) et l'extrémité libre de la seconde partie s'engage en-dessous de la moulure.

2. Emballage à preuve de violation selon la revendication 1, dans lequel la seconde partie comprend une pluralité de morceaux de segments (43) espacés suivant la circonférence et séparés par des fentes (S).

3. Emballage à preuve de violation selon la revendication 2, dans lequel la configuration des morceaux de segments est sensiblement rectangulaire.

4. Emballage à preuve de violation selon la revendication 2 ou 3, dans lequel le coude dans la collerette se trouve au niveau des bases des morceaux de segments ou près d'elles.

5. Emballage à preuve de violation selon l'une quelconque des revendications 2 à 4, dans lequel les morceaux de segments incluent un moyen pour augmenter leur rigidité.

6. Emballage à preuve de violation selon la revendication 5, dans lequel le moyen pour augmenter la rigidité des morceaux de segments comprend des parties déformées sur les morceaux de segments.

7. Emballage à preuve de violation selon la revendication 6, dans lequel ledit moyen com-

prend une nervure (61) qui s'étend axialement.

8. Emballage à preuve de violation selon l'une quelconque des revendications 2 à 7, qui inclut une pluralité de saillies (70) s'étendant axialement, espacées suivant la circonférence, sur la surface intérieure de la bande et alignées axialement avec les fentes (S) de telle sorte que les saillies empêchent l'introduction de moyens destinés à s'accrocher sur les morceaux de segments.

9. Emballage à preuve de violation selon la revendication 1, dans lequel la seconde partie est une seconde partie de collerette annulaire et continue.

10. Emballage à preuve de violation selon l'une quelconque des revendications 1 à 9, dans lequel la première partie de collerette annulaire et continue est sensiblement parallèle à l'axe de la fermeture.

11. Emballage à preuve de violation selon l'une quelconque des revendications 1 à 10, dans lequel la charnière comprend une surface supérieure (45) inclinée vers le bas et vers l'intérieur le long de la bande indicatrice de violation et une surface (48) globalement transversale qui s'étend de la bande jusqu'à une partie de section mince espacée de la surface intérieure de la bande indicatrice de violation.

12. Emballage à preuve de violation selon l'une quelconque des revendications 1 à 11, dans lequel l'épaisseur de la collerette augmente progressivement de la charnière jusqu'à l'extrémité libre.

13. Emballage à preuve de violation selon l'une quelconque des revendications 1 à 12, dans lequel la surface intérieure de la bande indicatrice de violation comprend une surface inclinée qui s'éloigne axialement de ladite paroi de base de la fermeture et radialement vers l'intérieur.

14. Fermeture de l'emballage à preuve de violation l'une des revendications 1 à 13.

15. Procédé de fabrication d'une fermeture comprenant un coude annulaire dans une collerette qui s'étend axialement vers l'intérieur par rapport à une paroi de base, procédé qui comprend:

- la formation d'une fermeture en plastique ayant une paroi de base et une jupe périphérique,

- la jupe portant une bande indicatrice de violation et une collerette incorporée qui s'étend radialement vers l'intérieur et axialement vers l'extérieur par rapport à la paroi de base,

- la collerette comprenant une partie de collerette annulaire et continue et une seconde partie, la partie annulaire de la collerette étant reliée à la bande indicatrice de violation par une partie formant charnière,

- puis l'avance d'un plongeur dans la fermeture pour accrocher la collerette et retourner la collerette de façon à ce qu'elle s'étende radialement vers l'intérieur et vers le haut par rapport à la paroi de base de la fermeture, ladite collerette étant en même temps coudée de telle sorte que ladite seconde partie s'étende depuis la partie de collerette annulaire et continue, en faisant par rapport à l'axe de la fermeture un angle plus important que celui de la partie de collerette annulaire et continue.

16. Procédé selon la revendication 15, dans lequel l'étape de formation de la seconde partie comprend la formation d'une pluralité de morceaux de segments, espacés suivant la circonférence, qui s'étendent vers le bas et vers l'extérieur depuis la partie de collerette continue.

17. Procédé selon la revendication 15, dans lequel l'étape de formation de la seconde partie comprend la formation d'une seconde partie de collerette annulaire et continue.

18. Procédé selon l'une quelconque des revendications 15 à 17, dans lequel l'étape de formation du coude dans la collerette comprend le fait de retenir le bord libre de la seconde partie en l'empêchant de bouger radialement vers l'intérieur et le fait d'appliquer une force axiale au bord libre, bord libre qui est empêché de se déplacer radialement vers l'intérieur, afin de retourner la collerette et d'y former un coude.

19. Appareil de fabrication d'une fermeture comprenant un coude annulaire dans une collerette qui s'étend axialement vers l'intérieur par rapport à une paroi de base, appareil qui comprend:

- un moyen pour former une fermeture en plastique ayant une paroi de base et une jupe périphérique, la jupe portant une bande indicatrice de violation et une collerette incorporée qui s'étend radialement vers l'intérieur et vers le bas par

5 rapport à la paroi de base,

- la collerette comprenant une partie de collerette annulaire et continue et une seconde partie avec un bord libre, la partie annulaire de la collerette étant reliée à la bande indicatrice de violation par une partie formant charnière, et

- un moyen pour faire avancer un plongeur (M) axialement par rapport à la fermeture,

10 dans lequel le plongeur est configuré pour retenir le bord libre de la seconde partie en l'empêchant de bouger radialement vers l'intérieur et pour appliquer une force axiale audit bord libre afin de retourner la collerette et d'y former un coude.

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26. Appareil selon la revendication 19, dans lequel le moyen pour former la seconde partie comprend un moyen pour former une pluralité de morceaux de segments, espacés suivant la circonférence, qui s'étendent vers le bas et vers l'extérieur depuis la partie de collerette continue.

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28. Appareil selon la revendication 19, dans lequel le moyen pour former la seconde partie comprend un moyen pour former une seconde partie de collerette annulaire et continue.

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22. Appareil selon l'une quelconque des revendications 19 à 21, dans lequel le plongeur (M) comprend une extrémité libre avec un cône (50) de centrage de fermeture, une partie (51) destinée à accrocher les filets de la fermeture, une première partie inclinée, une partie (52) formant diamètre pilote et un épaulement de retournement (53) si bien que, lors d'un déplacement relatif entre le plongeur et la fermeture, le plongeur accroche d'abord la collerette (40) contre le cône (50) de centrage de fermeture et, lorsqu'on fait davantage avancer le plongeur, la collerette atteint la partie (52) formant diamètre pilote, puis un déplacement relatif du plongeur et de la fermeture amène l'épaulement de retournement (53) à couder et à retourner la collerette et à former une charnière, et davantage de mouvement relatif entre le plongeur et la collerette fait que l'épaulement (53) traverse le diamètre de la charnière en dépassant la limite élastique de la charnière de sorte qu'elle reste en place.

23. Appareil selon l'une quelconque des revendications 19 à 22, qui comprend un moyen pour faire tourner le plongeur (M) pendant son déplacement par rapport à la fermeture.

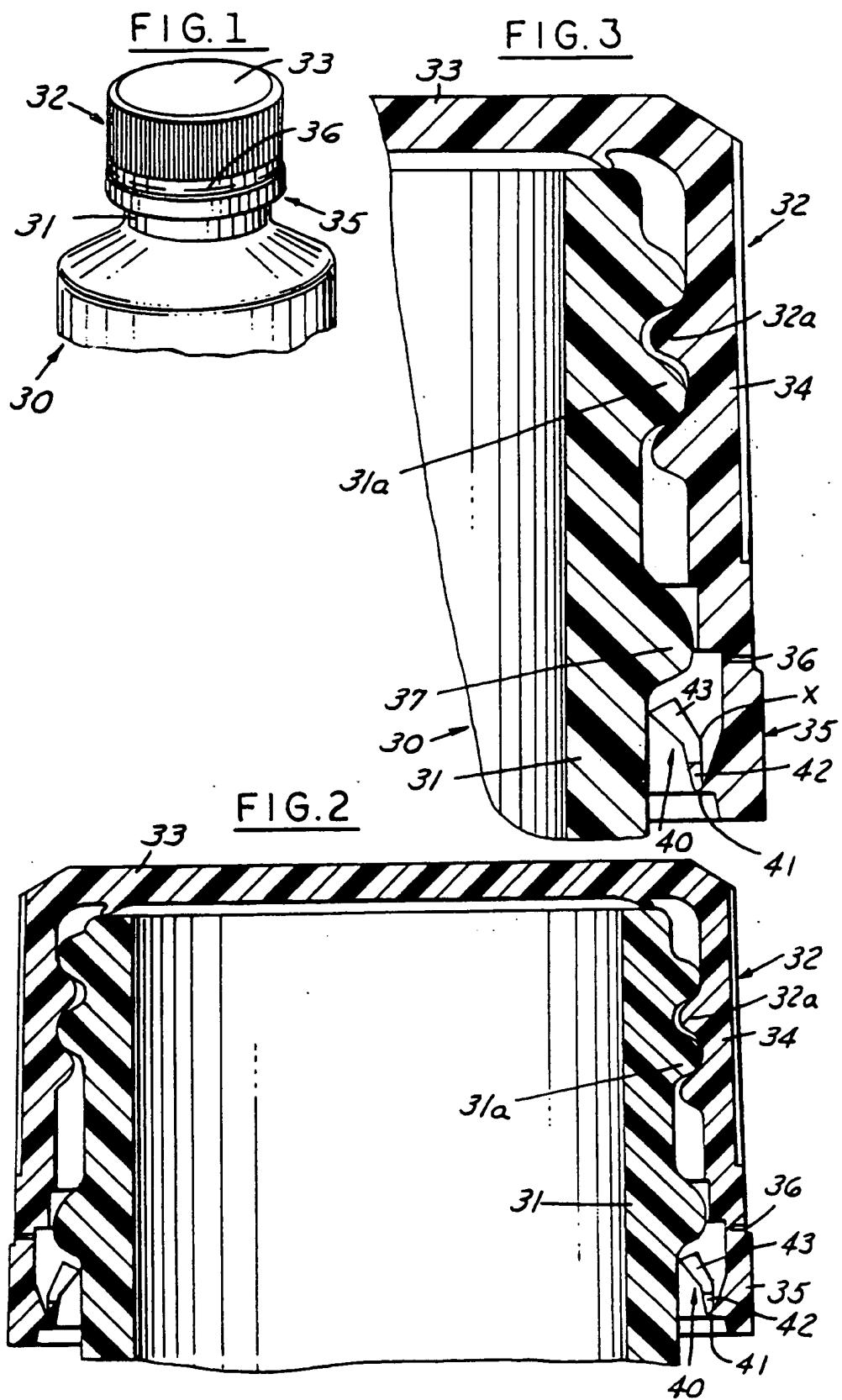


FIG.4

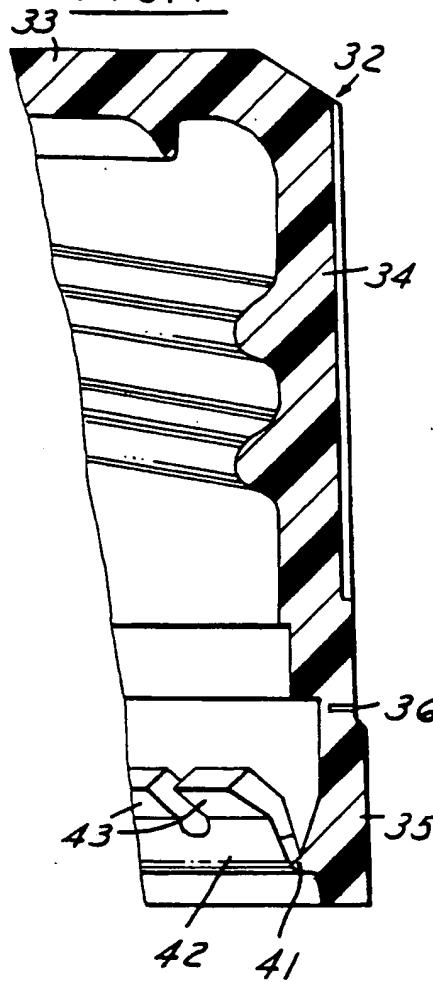


FIG.5

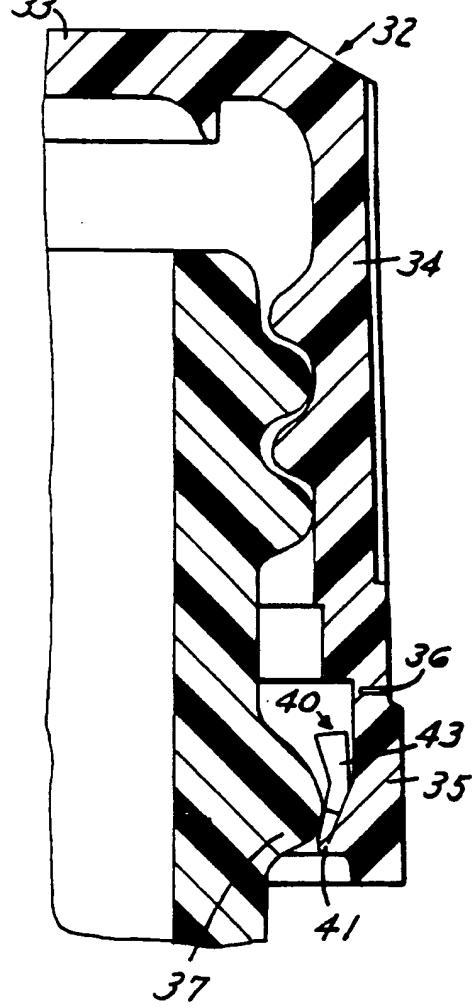


FIG.6

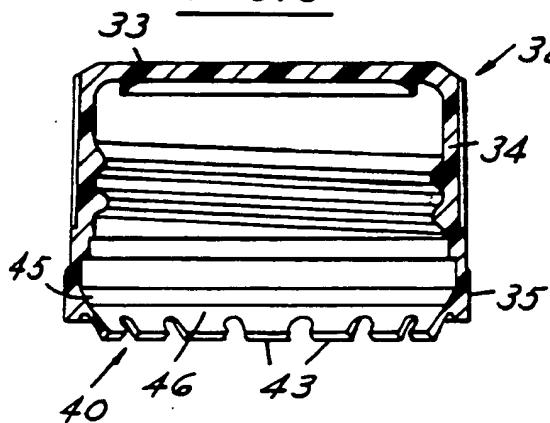


FIG.7

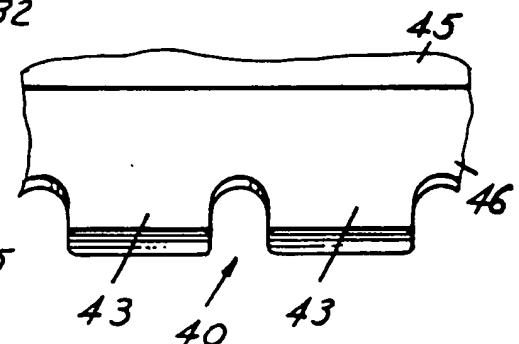


FIG.8A

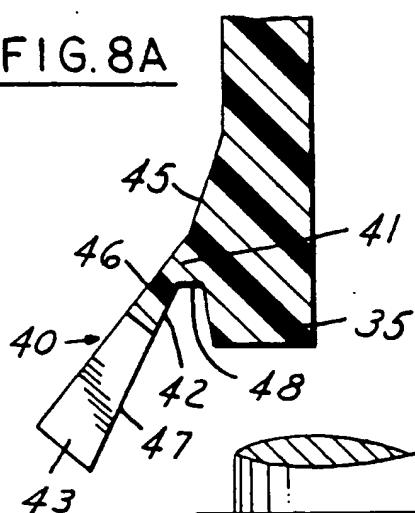


FIG.8B

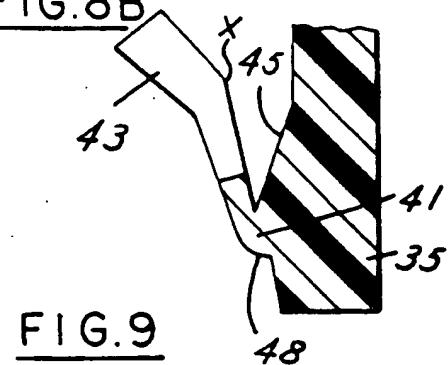
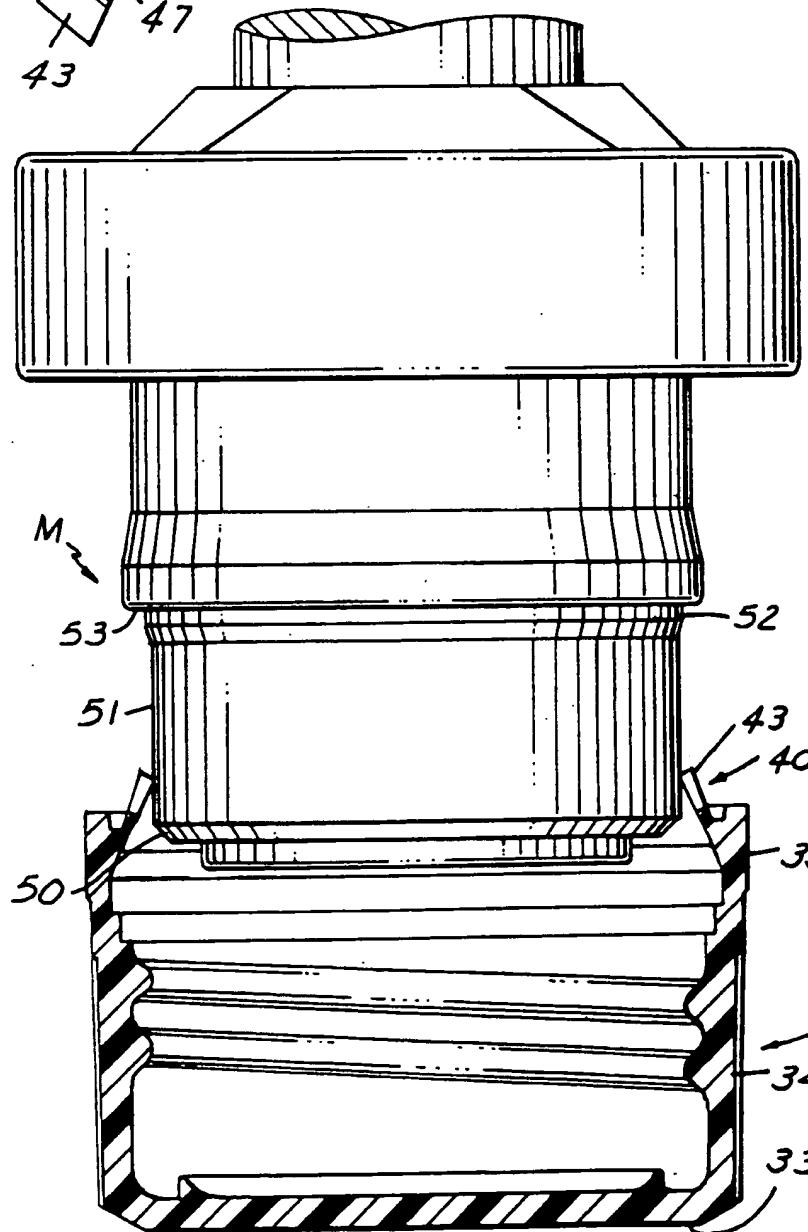


FIG.9



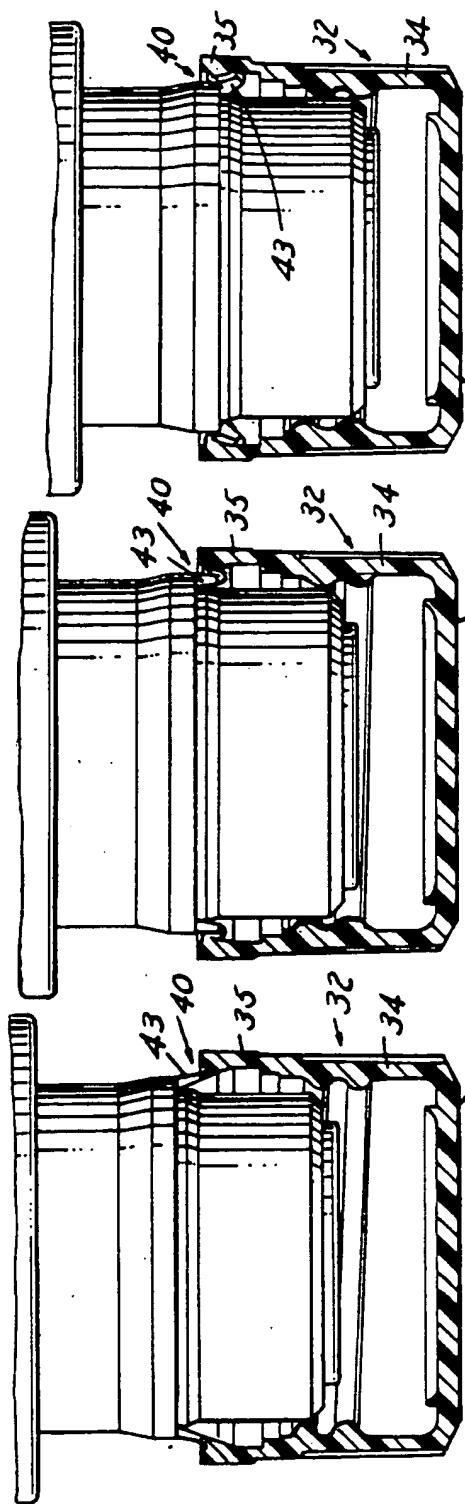


FIG.15

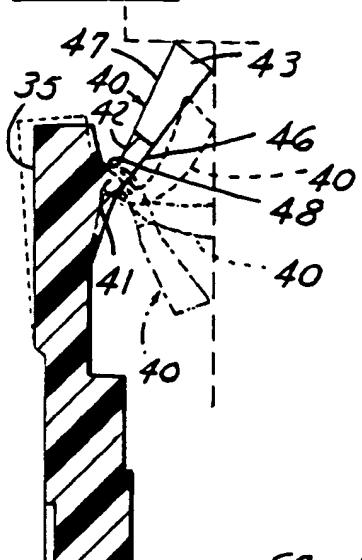


FIG.16

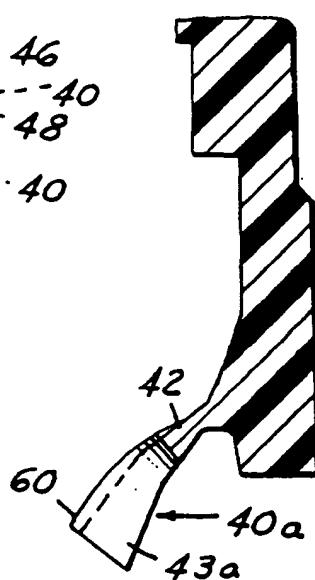


FIG.18

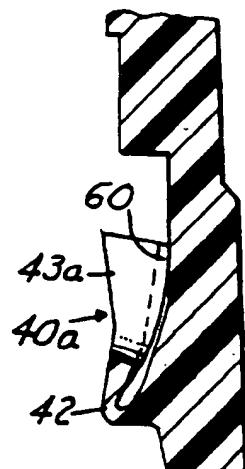


FIG.17

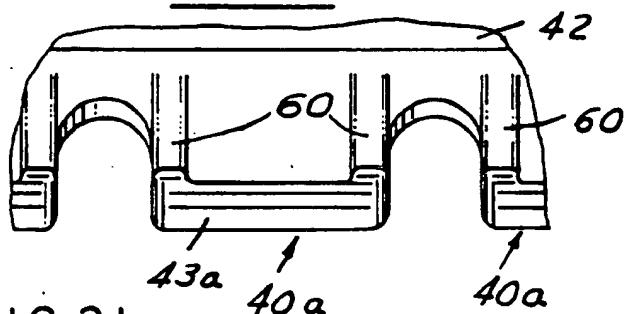


FIG.21

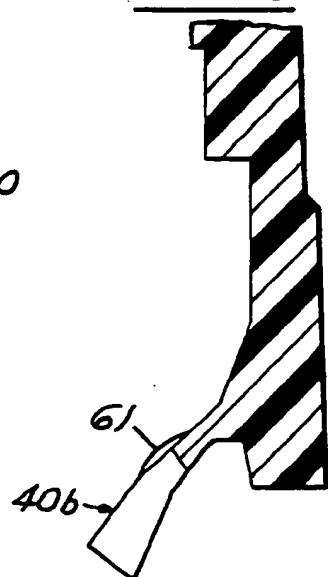
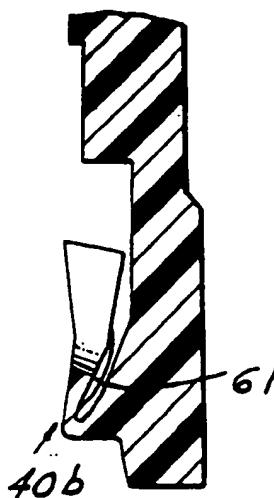


FIG.20

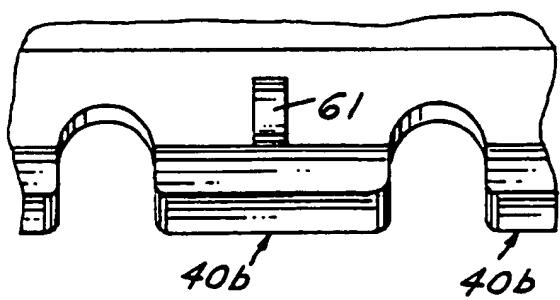


FIG.22

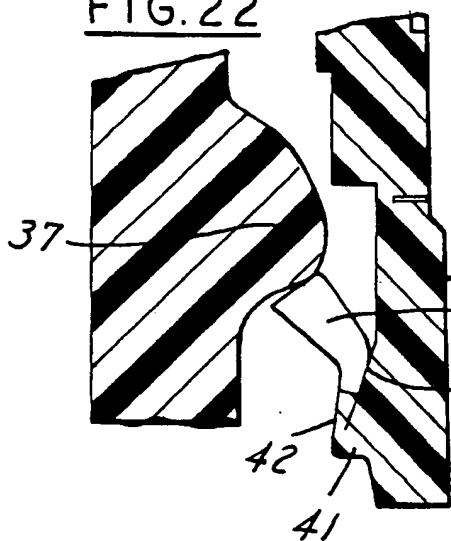


FIG.23

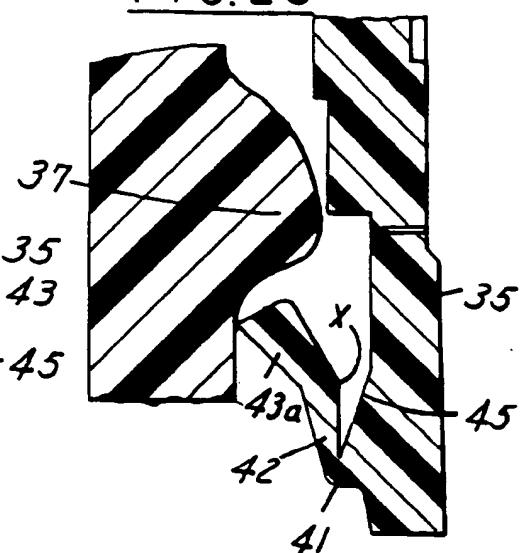


FIG.24

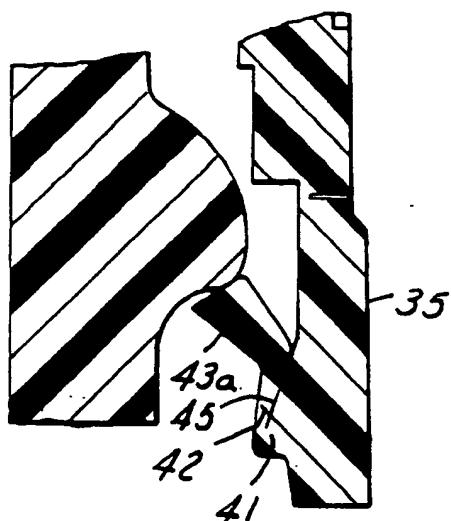


FIG.25A

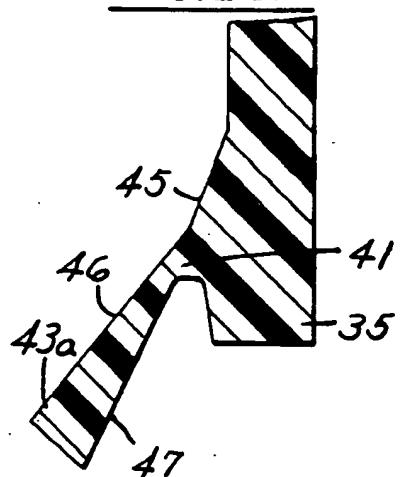


FIG.25B

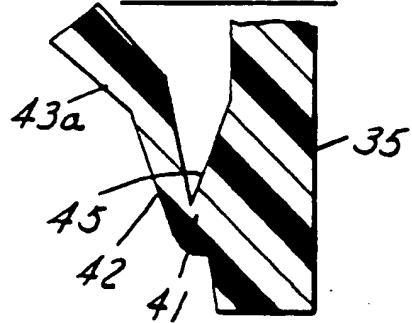


FIG.26

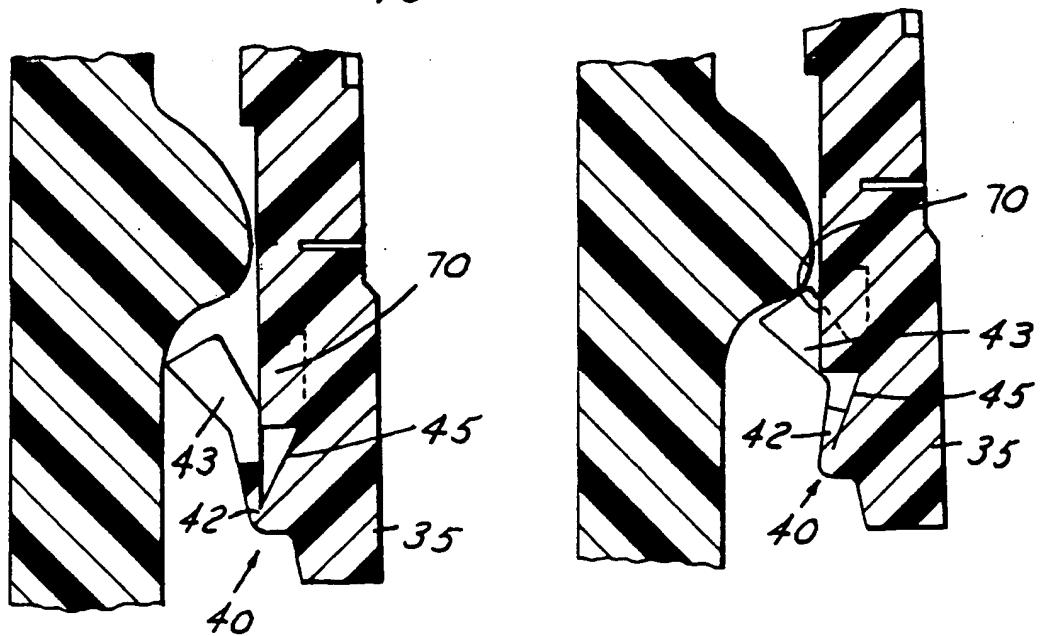
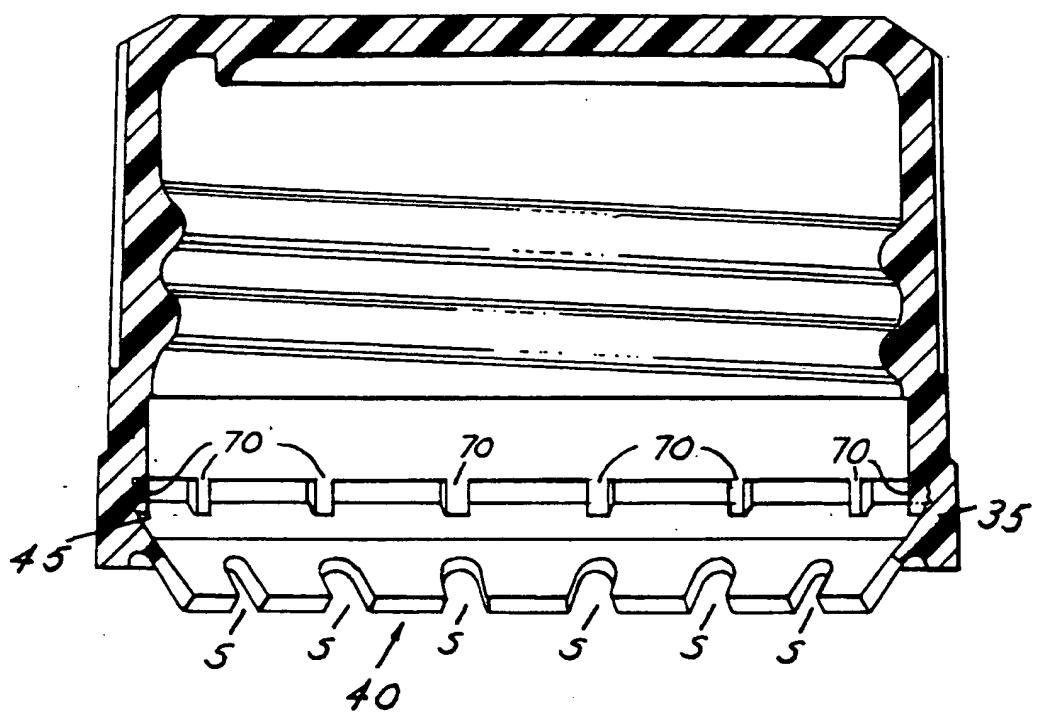


FIG.27

FIG.28